Operating the Model 452

Now that you have completed the assembly and experiments dealing with the Model 452 2-meter FM transceiver, you are probably very anxious to put it on the air and start using it. Before you do, be sure to read over this section for some operating hints and a few other precautions.

First of all, as we have mentioned before, you *must* have a valid Technician class amateur license in order to operate a 2-meter transmitter. If you have not obtained your license yet, make the necessary arrangements *now* to take the test so that you can get your license as quickly as possible. You will need to know the International Morse code (cw) well enough to copy plain messages at a rate of five words per minute and to answer a comprehensive multiple-choice examination covering the content of the message sent. This is not a difficult task, but it does take a little work to learn and remember the code characters. This is examination Element 1A and is also required for the Novice class amateur license.

In addition to the code test, you will have to pass two written examinations, Elements 2 and 3. Element 2 is a 20 question examination of basic radio rules and regulations, and elementary radio theory. Element 3 is a test of general amateur practice and regulations involving radio operation and apparatus – as well as provisions of treaties, statutes, and rules affecting amateur stations and operators. Element 3 consists of 50 multiple-choice questions covering the items mentioned above. You must get 74 percent of the questions correct to pass the examination.

Once you have passed the code test and the written test, you will have to wait for your license to be issued, even though you know that you have passed the tests. This is the hardest part! Be patient, and use your waiting time to listen on the amateur frequencies so that you can become familiar with operating procedures and the language involved in amateur communications.

You will hear "Q" signals used rather than the "10" codes frequently used on CB and commercial channels. You will soon learn to recognize these codes. Most amateur publications, such as the ARRL Radio Amateurs Handbook and the ARRL License Manual, have lists of the "Q" signals.

2-METER FREQUENCIES

As indicated earlier, most FM communications take place in the 146.00 MHz to 147.00 MHz segment of the 2-meter band. This band segment has been divided (on a volunteer basis, since there are no assigned "channels" or frequencies for amateurs within any given band) into standardized repeater pairs and simplex frequencies. Table 1, Table 2, and Table 3 summarize the "channels" most frequently used in this segment of the 2-meter band.

Table 1 shows the standard repeater pairs for the 146.00 MHz to 147.00 MHz segment. You should listen (set the front panel frequency switches of the Model 452) on the frequencies shown in the first column, and set the Mode switch to -600 to use these repeaters. The frequencies shown in bold type are the more popular frequencies. Notice that these are spaced at 30 kHz intervals beginning at 146.610 MHz. These are the original repeater frequencies and are received with the +5 kHz switch pushed in (off). The channels in regular type are offset 15 kHz from the other channels, and are also separated from each other by 30 kHz. The +5 kHz switch must be pulled out (on) to receive these frequencies.

The repeater whose output frequency is 147.00 MHz is a variable one, and the input frequency may be either 600 kHz above or below 147.00 MHz. That is, a repeater with an

TABLE 1

STANDARD REPEATER PAIRS IN THE 146 MHZ TO 147 MHZ RANGE (MODE SWITCH AT -600)

Repeater Output Frequency	Repeater Input Frequency
146.610	**146.010**
146.625	146.025
146.640	**146.040**
146.655	146.055
146.670	**146.070**
146.685	146.085
146.700	**146.100**
146.715	146.115
146.730	**146.130**
146.745	146.145
146.760	**146.160**
146.775	146.175
146.790	**146.190**
146.805	146.205
146.820	**146.220**
146.835	146.235
146.850	**146.250**
146.865	146.265
146.880	**146.280**
146.895	146.295
146.910	**146.310**
146.925	146.325
146.940	**146.340**
146.955	146.355
146.970	**146.370**
146.985	146.385
147.000	*

*See text

output frequency of 147.00 MHz may have an input frequency of either 146.400 MHz or 147.600 MHz. In addition, you may occasionally find "nonstandard" repeater pairs that operate with other than a 600 kHz difference between the input and output frequencies, or that are operating on other than 15 kHz offsets. You can listen to any of these repeaters, as long as their output frequency is on a multiple of 5 kHz. However, you may or may not be able to reach the repeater input, depending upon the repeater input frequency. The Model 452 is capable of using only the "standard" ±600 kHz transmit offset.

Table 2 shows the standard repeater pairs in the 147.00 MHz to 148.00 MHz segment. Again, the listings in bold type are the "normal" or first-choice pairs. You may also find repeaters operating on other frequencies.

When using the 147.000 MHz to 148.000 MHz repeaters, again set the front panel frequency switches to the frequency shown in the left-hand column. Set the Mode switch to +600 to transmit 600 kHz higher than the receive frequency. Be *very* sure not to use a frequency higher than 147.400 MHz with the Mode switch in the +600 position. To do so will cause the transmitter to operate at a frequency higher than 148.00 MHz, which will be *outside the amateur band!* This is an illegal mode of operation and subjects you to a fine or imprisonment! Always check the mode switch when you operate in this segment of the 2-meter band to be sure that you do not transmit on a frequency above 148.00 MHz.

Table 3 shows the simplex frequencies commonly used in the two segments of the 2-meter band. Almost everyone who operates 2-meter FM has a simplex frequency on 146.520 MHz, so listen there first for direct communications with other hams. These simplex frequencies are also spaced at 15 kHz intervals, and they fall in the space between the repeater input and output frequencies in both segments of the band. The most popular simplex frequencies are in bold type, while the less often used frequencies are in regular type.

In addition to those frequencies shown in Table 3, many other frequencies are commonly used for simplex operation. While this is not in keeping with the self-imposed "band plan" of Table 1 and Table 2, many hams prefer to operate on frequencies of their own choosing. This is perfectly legal. The only requirement is that one does not interfere with communications taking place on any given frequency.

An example of this is the frequency of 146.940 MHz. In the early days of 2-meter FM, this frequency was a national calling frequency for simplex communications. As you can see from Table 1, this is now considered a part of a standard repeater pair, even though many manufacturers of 2-meter amateur equipment still supply simplex crystals for this frequency. Before attempting to operate on this frequency in a simplex mode, you should always listen to be sure that there is no repeater operating on the frequency.

TABLE 2

STANDARD REPEATER PAIRS IN THE 147 MHZ TO 148 MHZ RANGE (MODE SWITCH AT +600)

Repeater Output Frequency	Repeater Input Frequency
147.000	*
147.015	147.615
147.030	**147.630**
147.045	147.645
147.060	**147.660**
147.075	147.675
147.090	**147.690**
147.105	147.705
147.120	**147.720**
147.135	147.735
147.150	**147.750**
147.165	147.765
147.180	**147.780**
147.195	147.795
147.210	**147.810**
147.225	147.825
147.240	**147.840**
147.255	147.855
147.270	**147.870**
147.285	147.885
147.300	**147.900**
147.315	147.915
147.330	**147.930**
147.345	147.945
147.360	**147.960**
147.375	147.975
147.390	**147.990**

*See text

TABLE 3

STANDARD SIMPLEX FREQUENCIES (MODE SWITCH AT SIM)

Simplex Frequencies	Simplex Frequencies
146.415	147.405
146.430	**147.420**
146.445	147.435
146.460	**147.450**
146.475	147.465
146.490	**147.480**
146.505	147.495
146.520	**147.510**
146.535	147.525
146.550	**147.540**
146.565	147.555
146.580	**147.570**
146.595	147.585

OPERATING PRACTICES

As indicated earlier, it is always a good idea to listen to the conversations taking place on the amateur frequencies for a while before you actually get on the air. As you listen to the operating procedures on the 2-meter band, you will probably hear both good and bad operating practices. You should try to observe and follow the good practices, and avoid the bad. Unfortunately, some of the bad practices may not appear to be so at first. However, if you are familiar with the rules governing amateur operators, you should be able to spot them soon enough.

Some of the rules that are most frequently neglected and even ignored concern the beginning and ending of a QSO (conversation). If you are calling a specific station, you must always identify the station you are calling, as well as your own station, in the first transmission. You should say something like: "WD2ABC, this is WA2XYZ calling." If WD2ABC answers your call, he need give only his own call in reply: "This is WD2ABC, go ahead."

After you have initiated a contact, you must identify your own station at least every ten minutes (if the contact lasts that long). This can be done by saying: "This is WA2XYZ for ID (identification)." Other stations with whom you are in contact will similarly identify their stations when it is their turn to transmit. We say "stations," because it is quite common to have a conversation going on among several different stations at the same time, particularly on repeaters.

On very busy repeaters it may be difficult to get a word in edgewise, because some inconsiderate people may "hog" the repeater. Usually, if you have a contact that lasts more than a few minutes on a repeater, you should pause every now and then and inquire if anyone would like to join the QSO or has need to use the repeater. This is only common courtesy and will allow a station with perhaps more important traffic to use the repeater.

At the end of a contact, you must again identify both the station you are talking with as well as your own station: "This is WA2XYZ clear with WD2ABC." If you are in contact with more than one station, you need identify only one of the stations, but you should designate who is to transmit next: "This is WA2XYZ clear and over to WD2ABC."

This is perhaps the most neglected procedure on the 2-meter band, and it is cause for citation by the FCC. *Always* be sure to sign out properly! It doesn't take much time, and it is an easy habit to establish right away.

Always listen before you transmit. This is particularly important when using a repeater. You should never interrupt a QSO that is in progress unless you have important traffic or you are invited to join in the QSO. To do otherwise could be considered willful interference, which could subject you to a stiff fine.

Always use the lowest power possible to carry on a contact. This means the low-power position for most operations through a repeater, unless you are a long distance from the repeater. For simplex operation from a mobile station, you will probably need the high-power capability to maintain contact. From a base station with a good high-gain antenna, you might need only low power. In some areas, using high power from a base station while operating through a repeater can cause interference on other repeaters – repeaters that you might not even be able to hear.

If you do use a repeater, you should abide by the rules set up by the repeater owner (person or club), and be willing to support the operation of the repeater in return for being able to use it. Generally, this means financial support by way of dues to a club, but may also mean (if you are interested and willing) helping out with the maintenance and upkeep of the repeater equipment. This could be a real benefit to you. Most amateur repeaters use surplus commercial transmitters and receivers which can give you some real hands-on experience with commercial equipment!

In summary, follow the rules of operation given by the FCC, and use common courtesy when using your 2-meter transceiver. Establish and follow good operating practices, and you'll have lots of fun using your Model 452.